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## PATENT ABSTRACTS OF JAPAN

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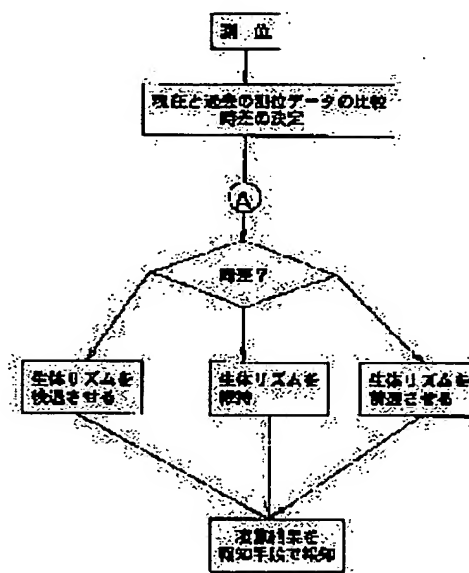
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## (54) JET LAG ELIMINATING DEVICE

## (57)Abstract:

PROBLEM TO BE SOLVED: To provide a convenient device without requiring the input of time differential by a user and perform suitable treatment at all times.

SOLUTION: When the place where one is now at present is measured, a time differential is calculated from previously measured result and present measured result. Stimulation timing to a human body for eliminating the jet lag is operated based on this jet lag information and the operated result is informed, whereby, as the time differential at a point before and after movement is calculated by a measured result by a measuring means at the jet lag eliminating device side, the user needs not know the time differential between a starting point and a destination and also the user needs not input the time lag and treatment for eliminating jet lag based on an accurate time differential can be performed.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] Jet lag dissolution equipment which consists of a time difference detection means to compute time difference from a positioning result, an operation means to calculate the stimulus timing to the living body for a jet lag dissolution based on time difference information, and an information means to report the result of an operation a positioning result and this time, the positioning means which positions a its present location, and last time.

[Claim 2] A positioning means is jet lag dissolution equipment according to claim 1 characterized by being the GPS receiver which positions by receiving a GPS signal.

[Claim 3] A positioning means is jet lag dissolution equipment according to claim 1 or 2 characterized by being what positions by receiving the signal relayed to a junction means to relay a GPS signal.

[Claim 4] A positioning means is jet lag dissolution equipment given in one term of claims 1-3 characterized by being what performs the positioning actuation according to directions by the input means.

[Claim 5] A positioning means is jet lag dissolution equipment given in one term of claims 1-3 characterized by being what performs the positioning actuation automatically for every predetermined time.

[Claim 6] A time difference detection means is jet lag dissolution equipment according to claim 4 or 5 characterized by being what outputs the integrated value of the time difference acquired for every positioning actuation.

[Claim 7] An operation means is jet lag dissolution equipment according to claim 1 characterized by being what performs the operation for a jet lag dissolution when the passing speed obtained from a positioning result is more than a predetermined rate.

[Claim 8] An operation means is jet lag dissolution equipment according to claim 1 characterized by being what calculates in consideration of the schedule after the destination arrival inputted from the input section.

[Claim 9] It is jet lag dissolution equipment according to claim 1 which is equipped with the light environment measurement section and characterized by an operation means being what calculates in consideration of the measurement result of the light environment measurement section.

[Claim 10] Jet lag dissolution equipment according to claim 1 characterized by having a high illuminance optical output means to output the high illuminance light for the stimulus to a living body while actuation is controlled according to the output of operation part.

[Claim 11] Jet lag dissolution equipment according to claim 1 characterized by having the interface section which controls actuation of a high illuminance optical output means to output the high illuminance light for the stimulus to a living body.

[Claim 12] Jet lag dissolution equipment according to claim 1 characterized by having the key station setting-out means for setting out of the key station of biorhythm.

[Claim 13] Jet lag dissolution equipment according to claim 1 characterized by having a key station setting-out means to change the key station of biorhythm from the existence of generating of time difference, and elapsed time.

[Claim 14] An operation means is jet lag dissolution equipment according to claim 1 characterized by holding the biorhythm data expressing the biorhythm of a user proper.

[Claim 15] It is jet lag dissolution equipment according to claim 14 which is equipped with a presumed means to presume a user's biorhythm, and is characterized by an operation means being what calculates with reference to the biorhythm presumed with this presumed means.

[Claim 16] A presumed means is jet lag dissolution equipment according to claim 15 characterized by being what presumes a user's biorhythm from change of light environment.

[Claim 17] A presumed means is jet lag dissolution equipment according to claim 15 characterized by being what presumes a user's biorhythm from the measurement result of a user's amount of physical activities.

[Claim 18] A presumed means is jet lag dissolution equipment according to claim 15 characterized by being what presumes a user's biorhythm from physiology measurement results, such as a user's depths temperature.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the equipment for canceling a jet lag (jet lag).

[0002]

[Description of the Prior Art] Although it lapses into the symptom of lowering of the mind-and-body malfunction condition of transience or durability, for example, a somnopathy, sleepiness in the daytime, lowering of concentration, a feeling of fatigue, and appetite when it moves to an area with the time difference of several hours or more with a jet plane etc. at a high speed This symptom called the jet lag reduces the productivity in work, or also reduces the quality of about [ producing an important decision mistake ] and everyday life, and serves as a big social problem by the end of today when the users of a jet plane are increasing in number by the overseas traveler, the expatriate personnel, etc.

[0003] By the way, a jet lag makes a factor the big gap produced mainly between the biorhythm of the inside of the body of about 24 time periods, and an environmental rhythm, and the fatigue which comes from that cooperativeness is confused temporarily, and the lack of sleep under travel and an irregular life is worsening the symptom of a jet lag further among two or more physiological functions in the living body in the process which is adapted for the local environment after migration in the area which has time difference.

[0004] While such a jet lag can cancel the biorhythm which the gap has produced to an environmental rhythm by making it re-align with an environmental rhythm, it is already scientifically proved about this point of making it align that high illuminance light is effective. That is, by giving the luminous stimulus by high illuminance light to the suitable time of day drawn from the value of the above-mentioned gap based on the phase response curve to the man of high illuminance light, biorhythm can be aligned with an environmental rhythm at an early stage, consequently a jet lag can be canceled.

[0005] In here, the value of the time difference of an origin and the arrival ground is substituted for the value of the gap with the above-mentioned environmental rhythm and biorhythm, and that about which calculates the time of day which should give the luminous stimulus by high illuminance light, and a user is told is offered. Moreover, what displays the time zone which should bask in daylight according to time difference is shown in the Patent Publication Heisei No. 502727 [ three to ] official report.

[0006]

[Problem(s) to be Solved by the Invention] In the above-mentioned conventional example, although a jet lag can be coped with by receiving a luminous stimulus at the directed time of day when the value of time difference is in agreement with the value of the gap with an environmental rhythm and biorhythm, it has the problem in that a user has to input the value of time difference. In an origin and the arrival ground, the user has to recognize how much time difference is, and also [ namely, ] Although the value must be inputted into accuracy, the user does not necessarily know the value of time difference upwards, and Since a mistake is made in inputting whether the time of day of arrival time is progressing to an origin, and whether it is behind even if it knows the value of time difference What forces the above-mentioned input

upon the user under travel busily surrounded by stress has high possibility of causing malfunction based on an incorrect input, and if it is made a user, it cannot be said that it is user-friendly.

[0007] Succeeding in this invention in view of such a point, the place made into the object is to offer the jet lag dissolution equipment which the input of the time difference by the user is unnecessary, and can perform always suitable treatment for a user-friendly top.

[0008]

[Means for Solving the Problem] The jet lag dissolution equipment which carries out a deer and is applied to this invention has the description a positioning result and this time the positioning means which positions a its present location, and last time to consist of a time difference detection means to compute time difference from a positioning result, an operation means to calculate the stimulus timing to the living body for a jet lag dissolution based on time difference information, and an information means to report the result of an operation.

[0009] In order to compute the time difference in the point before and after migration by the jet lag dissolution equipment side by the positioning result by the positioning means according to this invention, the user does not need to know the time difference between an origin and the arrival ground, it is not necessary to input upwards, and treatment for the jet lag dissolution based on exact time difference can be performed. The positioning means in here can use suitably the GPS receiver which positions by receiving a GPS signal. It can position at every point on the earth. At this time, directly in response to the fact that a GPS signal, it may not position, but you may position by receiving the signal relayed by junction means to relay a GPS signal. It can position the inside of a plane of a jet plane, and in a house.

[0010] Even if it performs positioning actuation by the positioning means according to directions by the input means, you may carry out automatically for every predetermined time, and a time difference detection means is convenient in any case, when it shall output the integrated value of the time difference acquired for every positioning actuation, and relaying some points and going to the last destination. Moreover, performing unnecessary data processing of an operation means as it is what calculates when the passing speed obtained from a positioning result is more than a predetermined rate is lost.

[0011] An operation means can perform smoothly jet lag dissolution treatment turned to the last destination as it is what calculates in consideration of the schedule after the destination arrival inputted from the input section. It has the light environment measurement section, and an operation means can use ambient light, when using light as a stimulus as it is what calculates in consideration of the measurement result of the light environment measurement section.

[0012] If it has a high illuminance optical output means to output the high illuminance light for the stimulus to a living body and actuation of a high illuminance optical output means is controlled by the output of an operation means, it is not necessary to prepare a high illuminance optical output means separately. When it shall have the interface section which controls actuation of a high illuminance optical output means to output the high illuminance light for the stimulus to a living body, what is in the destination as a high illuminance optical output means can be used.

[0013] It is also desirable to have the key station setting-out means for setting out of the key station of biorhythm. When biorhythm conforms to the environmental rhythm in a site by the long-term stay at the destination, it can prepare for the next long-distance migration. If it should have a key station setting-out means to change the key station of biorhythm from the existence of generating of time difference, and elapsed time, a change of a key station can be made automatically.

[0014] If the operation means holds the biorhythm data expressing the biorhythm of a user proper, more suitable jet lag dissolution treatment can be performed. In this case, have a presumed means to presume a user's biorhythm and, as for an operation means, it is desirable that it is what calculates with reference to the biorhythm presumed with this presumed means. What presumes a user's biorhythm can be suitably used for the presumed means in here from physiology measurement results, such as what presumes the measurement result of a user's body active mass which presumes a user's biorhythm from change of light environment to a

user's biorhythm, and a user's depths temperature.

[0015]

[Embodiment of the Invention] A positioning means by which one in drawing consisted of a GPS antenna 10 and a GPS receiver 11 in drawing 2 . The memory 20 which records the positioning result which two in drawing is an operation control section which consists of a microcomputer, and was obtained by this operation control section 2 with the positioning means 1, It has last time a positioning result, the time difference detecting element 21 which calculates time difference this time based on the difference of longitude in a positioning result, and the operation part 22 which calculates stimulus timing which gives the luminous stimulus for a jet lag dissolution to the body. And while the above-mentioned positioning means 1 is connected to the operation control section 2 and also the information means 4 for reporting to a user that the above-mentioned result of an operation is the input section 3 for performing positioning directions etc. is connected, the biorhythm information bureau 5 which dedicated the biorhythm-related data of the body which will be referred to on the occasion of the above-mentioned operation is connected.

[0016] The data about a phase response curve [ as opposed to the high illuminance light of the body in the up Norio body rhythm information bureau 5 ], Or the data of the luminous-stimulus timing corresponding to the discrepancy of the biorhythm and the environmental rhythm for which it asked based on the phase response curve, or required optical reinforcement, Or the parameter and biorhythm about biorhythm of the body are advanced, or the function about making it send etc. is dedicated, and the information means 4 is constituted by the display 40 and the buzzer 41 for beep sound generating which consist of a liquid crystal display.

[0017] The positioning means 1 is operated by operating the input section 3 in an origin, and memory 20 is made to incorporate that positioning result in this jet lag dissolution means. And the positioning result in the arrival ground is sent to the operation control section 2 by operating the input section 3 again in the arrival ground. The operation control section 2 makes a calculation decision of the time difference in the time difference detecting element 21 from the difference of the value of the LONG in the positioning result of the obtained arrival ground, and the positioning result of the origin recorded on memory 20. It opts for the treatment according to time difference, for example, those directions which should receive the luminous stimulus of what kind of strength to what kind of timing, based on the data dedicated to the biorhythm information bureau 5 in operation part 22, and this is reported to a user in the information section 4.

[0018] At this time, biorhythm progresses to an environmental rhythm and a case calculates the luminous-stimulus timing and the optical reinforcement which delay biorhythm according to the value of time difference, and are fitted to an environmental rhythm based on the data of the biorhythm information bureau 5. Conversely, when biorhythm is behind to the environmental rhythm, the luminous-stimulus timing and the optical reinforcement which biorhythm is advanced according to the value of time difference, and are fitted to an environmental rhythm are calculated based on the data of the biorhythm information bureau 5, and the result of an operation is reported in the information section 4. Moreover, when there is no time difference, or when time difference is minute, he is trying to report in the example shown in drawing 1 in quest of the luminous-stimulus timing and the optical reinforcement which are strengthened although the present biorhythm phase is not changed. To the display 40 for this information, the thing for which the important matter for winning popularity effectively, the formula of the drug for jet lag symptom relaxation, the important matter on a life, etc. display a luminous stimulus collectively reinforcement [ not only / luminous-stimulus timing or / optical / not only ] (illuminance) is desirable.

[0019] Although the above-mentioned example showed the GPS receiver 11 which can ensure positioning at every point on the earth as a positioning means 2, it does not restrict to this. For example, you may position by receiving the data utility about a location from the electric wave of a local unit like FM wave, and a receiving antenna and a positional information detector can constitute the positioning means 3 in this case. A universal time meter etc. may be used and LONG may be roughly presumed from the difference between the time of a criterion, and a local time.

[0020] Even when using the GPS receiver 11, jet lag dissolution equipment itself does not need to be equipped with the GPS receiver 11, it may establish a junction means to transmit the GPS receiver's 11 positioning result, and may receive the positioning result sent out from this junction means. If such a junction means is established, it will be convenient, when becoming what can obtain a positioning result the inside of a plane of a jet plane, and in a house and performing the below-mentioned positioning actuation automatically periodically, or when starting advancing biorhythm or delaying it in preparation for the jet lag dissolution after arrival during migration, since it is very long distance migration. A junction means may re-send out the GPS signal itself the inside of a plane and in a house.

[0021] In said explanation of operation, although what performs positioning actuation for directions by the input means 3 in the carrier beam case was shown, it is good for the input means 3 in this case to use what set aside the switch operated in an origin, and the switch operated with an arrival background. When an origin switch is pushed, a positioning result cannot be compared with the past positioning result, but when an arrival ground switch is pushed, time difference shall be calculated, and decision of being a destination in drawing 3 can be judged by whether the arrival ground switch was operated. It is hard turning up to generate the failure of eliminating the past positioning result by actuation of a count in which the same switch was mistaken as compared with the case where multiple-times actuation is carried out, and a count mistake also decreases.

[0022] The positioning means 1 may perform positioning actuation automatically periodically. Whether it arrived at whether the origin was left and or not the destination that what is necessary is just to judge a positioning result by comparing with the last positioning result in this case, about time difference While repeating actuation of writing positioning data in memory 20 this time while computing time difference between the last positioning data for every positioning actuation, as shown in drawing 4 , the computed time difference is added to the aggregate value of the time difference from the event of making it start. And if 2 hours is exceeded, when it is made for a time difference aggregate value to operate the operation part 22 which asks for the luminous-stimulus timing and the optical reinforcement which cancel a jet lag, the input from a user is sufficient at the first start time.

[0023] Moreover, if initiation of high-speed migration of a user is detectable, the operation for canceling a jet lag can be started at an early stage. In this case, as shown in drawing 5 , the time difference detecting element 21 calculates passing speed periodically from the positioning result of the positioning means 1 and time amount which operate automatically. When this passing speed is over 400km/h If it is made to operate the operation part 22 which asks for the luminous-stimulus timing and the optical reinforcement which cancel a jet lag Even if there is no input from a user, presumption of a user's migration direction or a start location can also be performed using the positioning information on the past which turns to what can tell a user about the danger that a jet lag will arise up, and was memorized.

[0024] Before operating operation part 22 from the decision of time difference and asking for the treatment of a jet lag dissolution, it may be made to perform a migration place check routine as shown in drawing 6 . That is, when time difference is computed, it checks whether long-distance migration is given to the user, and the input of whether a current value is a destination is required. For example, is "long-distance migration performed? Is this the destination of a travel? While taking out the display " to a display 40 and taking a check, when it is not a destination, a destination region selection demand and a detail destination selection demand are displayed, and the last destination is obtained as data before the arrival. In addition, the LONG data about a destination region or the detail destination to display are beforehand registered into the operation control section 2 as data. Since the data of the last destination can be obtained before arriving at the last destination while being able to distinguish whether a point of arrival is the last destination, if it does in this way, not the jet lag management to the time difference in a its present location but the jet lag management to the time difference in the last destination can be started at an early stage.

[0025] It is also desirable to perform jet lag dissolution treatment which performs a stay days check routine as shown in drawing 7 , and is different according to stay days. When a stay at the



destination continues for a long period of time, while performing display of choosing the stimulus and guidance which are easy to be adapted for "destination", the jet lag dissolution treatment which doubles biorhythm is calculated and displayed on the environmental rhythm in the destination in operation part 22. When a stay at the destination is a less than short period, for example, two days It is not the stimulus or guidance in which it fits biorhythm to the environmental rhythm in the destination quickly in performing the display "whether it returns to a departure point as it is" and returning to a departure point. When it returns to an origin, and performing the stimulus and guidance which a jet lag stops being able to produce easily and not returning to a departure point, said migration place check routine is called, the input of the next destination is urged, and it is made to carry out the stimulus and guidance for which a jet lag stops being generated easily at the next destination. Jet lag dissolution treatment according to the schedule of a travel can be performed.

[0026] Moreover, if it enables it to use the above-mentioned information while enabling it to memorize the information which shows the long-distance and high-speed migration generated in the near past when long-distance and high-speed migration newly occurs, jet lag dissolution treatment for which it was suitable with a user's situation can be performed. Namely, although the key station of the time difference calculation from there being little possibility that biorhythm is aligning with the environmental rhythm in the point thoroughly is considered as as [ the origin in the past migration ] when a stay at the point at which it arrived by the past migration is less than three days The key station of time difference calculation is changed into the origin (current value) of new migration from it being thought that biorhythm has already aligned with the environmental rhythm in the point when a stay at the point at which it arrived by the past migration is a long period of time. However, since it is that there is individual difference, it is desirable to take a check of a user about modification of a key station in any case. In two above-mentioned modification checks, the nuance shall be changed most, and choosing O.K. shall be strongly called for by the direction of the acknowledgment indicator of key station modification in a long-term stay. Anyway, if a key station is changed, the migration information on past will be eliminated.

[0027] Of course, you may enable it to change a key station at the event of arbitration. A key station check routine is called and it enables it to change a its present location into a key station. Moreover, when the predetermined time detection of the generating of time difference (long-distance migration) cannot be carried out, it may be made to make an automatic change of the its present location in a key station. Although the high illuminance light for jet lag dissolution treatment will be separately obtained with a high illuminance light irradiation device, jet lag dissolution equipment may contain a high illuminance light irradiation device. In this case, a high illuminance light irradiation device shall be operated at the time of day which should receive the luminous stimulus by high illuminance light. Of course, also when a high illuminance light irradiation device is another equipment, the interface 60 which connects jet lag dissolution equipment and the high illuminance light irradiation device 6 is established, and you may enable it to control the actuation time of day of the high illuminance light irradiation device 6 by the jet lag dissolution equipment side to be shown in drawing 2 . That is, through jet lag dissolution equipment, the power source of the high illuminance light irradiation device 6 is supplied, or the high illuminance light irradiation device 6 is operated by sending an on-off signal to the high illuminance light irradiation device 6 which can be operated by remote control from a jet lag dissolution equipment side. This is especially effective when the table top type, the stand mold, or the large-sized high illuminance light irradiation device 6 is reserved in the home or the hotel of a migration place. In addition, if the high illuminance light irradiation device 6 of a visor mold is used, utilization in migration will also become possible.

[0028] Ambient light, such as sunlight, may be used not using a high illuminance light irradiation device. In this case, utilization of light environment can be directed to a user by preparing the light environment measurement section which measures light environment, such as an illuminance of ambient light, and a color temperature, to jet lag dissolution equipment. For example, it directs to a user to direct to a user to bask in light as much as possible using surrounding light environment, if the illuminance of the light environment in the luminous-

stimulus time zone for which operation part 22 asked is effective in a jet lag dissolution, to emit warning, if it is the time zone which should avoid light, and to avoid light. Also when using a high illuminance light irradiation device, it is also possible to change the result of an operation in consideration of the ambient light measured in the light environment measurement section. If the buzzer 41 in the information means 4 is operated and a beep sound is emitted on the occasion of the above-mentioned warning, warning can be certainly given to a user. You may make it call a user's attention by the oscillation by vibrator besides information warning by the sound.

[0029] By the way, biorhythm may differ from the phase response curve to a stimulus greatly from the form with standard biorhythm, when it may differ upwards for every individual and the life is irregular. In such a case, since it is inadequate, deciding the timing and reinforcement of a stimulus only from the contents of migration, such as time difference and the direction of migration, inputs into the biorhythm information bureau 5 that individual's biorhythm data measured beforehand, and it is also desirable to refer to this biorhythm data in the operation of jet lag dissolution processing. [ living body ]

[0030] Moreover, the presumed means of a user's biorhythm is formed in jet lag dissolution equipment, and jet lag dissolution equipment may enable it to collect the above-mentioned individual's biorhythm data. "as this presumed means -- Are you a mold in the morning? it is a mold night" -- "about what time, if it averages expression parameter of biorhythm which presents the question about the life style of the user whether it can rise automatically", and it has as a basic form from the reply Is there any habit of " and "nap (for example, the amplitude --)? While being able to use what changes a rising phase and the minimum phase, the above-mentioned output of the light environment measurement section can also be used at this time, and also what is equipped with the test-section material of a user's body active mass or depths temperature, and presumes individual biorhythm from this measurement result can be used.

[0031] The example which measured the body active mass continuously for five days by the PIAZO piezoelectric acceleration sensor by which drawing 10 attached to the lumbar part the example which measured the body active mass continuously for five days by the PIAZO piezoelectric acceleration sensor which attached drawing 9 to the wrist is shown. In both cases, at the time of sleep (night), more than a value is almost fixed to 0 at the time of near and recovery (day ranges) (2 - 3 minutes or more), a high value can be intermittently acquired for spacing as a dish. Thus, if sleep and recovery are mostly repeated at fixed spacing, since a body active mass can serve as an index of biorhythm, it can evaluate biorhythm automatically from the measurement result of a body active-mass test section. In this case, recovery time of day and sleeping time of day can be presumed by performing a smoothing filter and threshold processing to the data of a body active mass, and if it enters in the time zone when the recovery time of day or sleeping time of day which repeated this processing more than for two days, and was obtained is fixed, that recovery time of day or sleeping time of day will be used as an index of biorhythm. Of course, it is made to perform this processing at the period when time difference has not occurred automatically.

[0032] Also in depths temperature, since the biorhythm of 24 time periods is clearly shown so that clearly from the measurement result at the time of measuring rectal temperature more than for five days by the rectal temperature sensor shown in drawing 11 , if the minimum point phase and peak phase of depths temperature are presumed for example, by the KOSAINA method, those time of day can be made into the index of biorhythm. Since it is clearer than the case of the amount of physical activities this index's to reflect biorhythm in accuracy, it is dramatically useful in the operation of the stimulus timing for the dissolution of a jet lag. In addition, an eardrum temperature and a core temp can also estimate depths temperature in addition to rectal temperature. Moreover, it can replace with depths temperature and hormone measurement of Melatonin, cortisol, etc. can also estimate biorhythm automatically to accuracy again.

[0033] Although the above explanation explained the case where the luminous stimulus by high illuminance light was used as treatment of a jet lag dissolution, it may not restrict to this and the time of day which should take in drugs, such as Melatonin hormone and a hypnotic, may be displayed.

[0034]

[Effect of the Invention] The jet lag dissolution equipment in this invention as mentioned above The positioning means which positions a its present location, and a time difference detection means to compute time difference from a positioning result last time a positioning result and this time, An operation means to calculate the stimulus timing to the living body for a jet lag dissolution based on time difference information, In order to consist of an information means to report the result of an operation and to compute the time difference in the point before and after migration by the jet lag dissolution equipment side by the positioning result by the positioning means While it can consider as what has the good user-friendliness which the user does not need to know the time difference between an origin and the arrival ground, and does not need to input upwards, therefore does not trouble a user, treatment for the jet lag dissolution based on exact time difference information can be performed.

[0035] And if the GPS receiver which positions by receiving a GPS signal as the above-mentioned positioning means is used, since it can position at every point on the earth, the arrival ground cannot be chosen and always optimal jet lag dissolution treatment can be performed. If it does not position directly in response to the fact that a GPS signal, but it positions by receiving the signal relayed by junction means to relay a GPS signal at this time, since it can position the inside of a plane of the jet plane under migration, and in a house Jet lag dissolution treatment can also be started from the event of moving until the inconvenience produced since the direct reception of the GPS signal cannot be carried out is lost upwards and it arrives at the destination.

[0036] If positioning actuation by the positioning means is performed according to directions by the input means, the arrival event to the destination can be directed clearly. Moreover, positioning actuation by the positioning means may be automatically performed for every predetermined time. In this case, since the need for directions by the input means is lost, user-friendliness becomes still better. In any case, if a time difference detection means shall output the integrated value of the time difference acquired for every positioning actuation, while jet lag dissolution treatment can be started during migration, the time difference in the last destination can also be acquired.

[0037] Moreover, performing unnecessary data processing of an operation means as it is what calculates when the passing speed obtained from a positioning result is more than a predetermined rate is lost. Furthermore, an operation means can perform smoothly jet lag dissolution treatment towards the last destination, without influencing not much that it is what calculates in consideration of the schedule after the destination arrival inputted from the input section of the environmental rhythm of the course ground the middle.

[0038] It may have the light environment measurement section and an operation means may calculate in consideration of the measurement result of the light environment measurement section. When using light as a stimulus for a jet lag dissolution, ambient light can be used positively. If it has a high illuminance optical output means to output the high illuminance light for the stimulus to a living body, while it will become unnecessary to prepare a high illuminance optical output means separately, jet lag dissolution treatment can be exactly performed at suitable time of day.

[0039] Since what should be equipped with the interface section which controls actuation of a high illuminance optical output means to output the high illuminance light for the stimulus to a living body, and is in the destination as a high illuminance optical output means in this case can be used, it becomes what it becomes unnecessary to have walked around with high illuminance optical output equipment simultaneously, and was suitable for the travel. It is also desirable to have the key station setting-out means for setting out of the key station of biorhythm. When biorhythm conforms to the environmental rhythm in a site by the long-term stay at the destination, it can prepare for the next long-distance migration, and jet lag dissolution treatment can always be performed appropriately. If it should have a key station setting-out means to change the key station of biorhythm from the existence of generating of time difference, and elapsed time, a change of the above-mentioned key station can be made automatically, and user-friendliness will become good.

[0040] If the operation means holds the biorhythm data expressing a user individual's biorhythm,

more suitable jet lag dissolution treatment can be performed. In this case, it has a presumed means to presume a user's biorhythm, and, as for an operation means, it is desirable to constitute as what calculates with reference to the biorhythm presumed with this presumed means. As a presumed means, what presumes a user's biorhythm can be suitably used from physiology measurement results, such as what presumes the measurement result of a user's body active mass which presumes a user's biorhythm from change of light environment to a user's biorhythm, and a user's depths temperature.

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**TECHNICAL FIELD**

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[Field of the Invention] This invention relates to the equipment for canceling a jet lag (jet lag).

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[Translation done.]

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**PRIOR ART**

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[Description of the Prior Art] Although it lapses into the symptom of lowering of the mind-and-body malfunction condition of transience or durability, for example, a somnopathy, sleepiness in the daytime, lowering of concentration, a feeling of fatigue, and appetite when it moves to an area with the time difference of several hours or more with a jet plane etc. at a high speed This symptom called the jet lag reduces the productivity in work, or also reduces the quality of about [ producing an important decision mistake ] and everyday life, and serves as a big social problem by the end of today when the users of a jet plane are increasing in number by the overseas traveler, the expatriate personnel, etc.

[0003] By the way, a jet lag makes a factor the big gap produced mainly between the biorhythm of the inside of the body of about 24 time periods, and an environmental rhythm, and the fatigue which comes from that cooperativeness is confused temporarily, and the lack of sleep under travel and an irregular life is worsening the symptom of a jet lag further among two or more physiological functions in the living body in the process which is adapted for the local environment after migration in the area which has time difference.

[0004] While such a jet lag can cancel the biorhythm which the gap has produced to an environmental rhythm by making it re-align with an environmental rhythm, it is already scientifically proved about this point of making it align that high illuminance light is effective. That is, by giving the luminous stimulus by high illuminance light to the suitable time of day drawn from the value of the above-mentioned gap based on the phase response curve to the man of high illuminance light, biorhythm can be aligned with an environmental rhythm at an early stage, consequently a jet lag can be canceled.

[0005] In here, the value of the time difference of an origin and the arrival ground is substituted for the value of the gap with the above-mentioned environmental rhythm and biorhythm, and that about which calculates the time of day which should give the luminous stimulus by high illuminance light, and a user is told is offered. Moreover, what displays the time zone which should bask in daylight according to time difference is shown in the Patent Publication Heisei No. 502727 [ three to ] official report.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] The jet lag dissolution equipment in this invention as mentioned above The positioning means which positions a its present location, and a time difference detection means to compute time difference from a positioning result last time a positioning result and this time, An operation means to calculate the stimulus timing to the living body for a jet lag dissolution based on time difference information, In order to consist of an information means to report the result of an operation and to compute the time difference in the point before and after migration by the jet lag dissolution equipment side by the positioning result by the positioning means While it can consider as what has the good user-friendliness which the user does not need to know the time difference between an origin and the arrival ground, and does not need to input upwards, therefore does not trouble a user, treatment for the jet lag dissolution based on exact time difference information can be performed.

[0035] And if the GPS receiver which positions by receiving a GPS signal as the above-mentioned positioning means is used, since it can position at every point on the earth, the arrival ground cannot be chosen and always optimal jet lag dissolution treatment can be performed. If it does not position directly in response to the fact that a GPS signal, but it positions by receiving the signal relayed by junction means to relay a GPS signal at this time, since it can position the inside of a plane of the jet plane under migration, and in a house Jet lag dissolution treatment can also be started from the event of moving until the inconvenience produced since the direct reception of the GPS signal cannot be carried out is lost upwards and it arrives at the destination.

[0036] If positioning actuation by the positioning means is performed according to directions by the input means, the arrival event to the destination can be directed clearly. Moreover, positioning actuation by the positioning means may be automatically performed for every predetermined time. In this case, since the need for directions by the input means is lost, user-friendliness becomes still better. In any case, if a time difference detection means shall output the integrated value of the time difference acquired for every positioning actuation, while jet lag dissolution treatment can be started during migration, the time difference in the last destination can also be acquired.

[0037] Moreover, performing unnecessary data processing of an operation means as it is what calculates when the passing speed obtained from a positioning result is more than a predetermined rate is lost. Furthermore, an operation means can perform smoothly jet lag dissolution treatment towards the last destination, without influencing not much that it is what calculates in consideration of the schedule after the destination arrival inputted from the input section of the environmental rhythm of the course ground the middle.

[0038] It may have the light environment measurement section and an operation means may calculate in consideration of the measurement result of the light environment measurement section. When using light as a stimulus for a jet lag dissolution, ambient light can be used positively. If it has a high illuminance optical output means to output the high illuminance light for the stimulus to a living body, while it will become unnecessary to prepare a high illuminance optical output means separately, jet lag dissolution treatment can be exactly performed at suitable time of day.

[0039] Since what should be equipped with the interface section which controls actuation of a high illuminance optical output means to output the high illuminance light for the stimulus to a living body, and is in the destination as a high illuminance optical output means in this case can be used, it becomes what it becomes unnecessary to have walked around with high illuminance optical output equipment simultaneously, and was suitable for the travel. It is also desirable to have the key station setting-out means for setting out of the key station of biorhythm. When biorhythm conforms to the environmental rhythm in a site by the long-term stay at the destination, it can prepare for the next long-distance migration, and jet lag dissolution treatment can always be performed appropriately. If it should have a key station setting-out means to change the key station of biorhythm from the existence of generating of time difference, and elapsed time, a change of the above-mentioned key station can be made automatically, and user-friendliness will become good.

[0040] If the operation means holds the biorhythm data expressing a user individual's biorhythm, more suitable jet lag dissolution treatment can be performed. In this case, it has a presumed means to presume a user's biorhythm, and, as for an operation means, it is desirable to constitute as what calculates with reference to the biorhythm presumed with this presumed means. As a presumed means, what presumes a user's biorhythm can be suitably used from physiology measurement results, such as what presumes the measurement result of a user's body active mass which presumes a user's biorhythm from change of light environment to a user's biorhythm, and a user's depths temperature.

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[Translation done.]



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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] In the above-mentioned conventional example, although a jet lag can be coped with by receiving a luminous stimulus at the directed time of day when the value of time difference is in agreement with the value of the gap with an environmental rhythm and biorhythm, it has the problem in that a user has to input the value of time difference. In an origin and the arrival ground, the user has to recognize how much time difference is, and also [ namely, ] Although the value must be inputted into accuracy, the user does not necessarily know the value of time difference upwards, and Since a mistake is made in inputting whether the time of day of arrival time is progressing to an origin, and whether it is behind even if it knows the value of time difference What forces the above-mentioned input upon the user under travel busily surrounded by stress has high possibility of causing malfunction based on an incorrect input, and if it is made a user, it cannot be said that it is user-friendly.

[0007] Succeeding in this invention in view of such a point, the place made into the object is to offer the jet lag dissolution equipment which the input of the time difference by the user is unnecessary, and can perform always suitable treatment for a user-friendly top.

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**MEANS**

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[Means for Solving the Problem] The jet lag dissolution equipment which carries out a deer and is applied to this invention has the description a positioning result and this time the positioning means which positions a its present location, and last time to consist of a time difference detection means to compute time difference from a positioning result, an operation means to calculate the stimulus timing to the living body for a jet lag dissolution based on time difference information, and an information means to report the result of an operation.

[0009] In order to compute the time difference in the point before and after migration by the jet lag dissolution equipment side by the positioning result by the positioning means according to this invention, the user does not need to know the time difference between an origin and the arrival ground, it is not necessary to input upwards, and treatment for the jet lag dissolution based on exact time difference can be performed. The positioning means in here can use suitably the GPS receiver which positions by receiving a GPS signal. It can position at every point on the earth. At this time, directly in response to the fact that a GPS signal, it may not position, but you may position by receiving the signal relayed by junction means to relay a GPS signal. It can position the inside of a plane of a jet plane, and in a house.

[0010] Even if it performs positioning actuation by the positioning means according to directions by the input means, you may carry out automatically for every predetermined time, and a time difference detection means is convenient in any case, when it shall output the integrated value of the time difference acquired for every positioning actuation, and relaying some points and going to the last destination. Moreover, performing unnecessary data processing of an operation means as it is what calculates when the passing speed obtained from a positioning result is more than a predetermined rate is lost.

[0011] An operation means can perform smoothly jet lag dissolution treatment turned to the last destination as it is what calculates in consideration of the schedule after the destination arrival inputted from the input section. It has the light environment measurement section, and an operation means can use ambient light, when using light as a stimulus as it is what calculates in consideration of the measurement result of the light environment measurement section.

[0012] If it has a high illuminance optical output means to output the high illuminance light for the stimulus to a living body and actuation of a high illuminance optical output means is controlled by the output of an operation means, it is not necessary to prepare a high illuminance optical output means separately. When it shall have the interface section which controls actuation of a high illuminance optical output means to output the high illuminance light for the stimulus to a living body, what is in the destination as a high illuminance optical output means can be used.

[0013] It is also desirable to have the key station setting-out means for setting out of the key station of biorhythm. When biorhythm conforms to the environmental rhythm in a site by the long-term stay at the destination, it can prepare for the next long-distance migration. If it should have a key station setting-out means to change the key station of biorhythm from the existence of generating of time difference, and elapsed time, a change of a key station can be made automatically.

[0014] If the operation means holds the biorhythm data expressing the biorhythm of a user

proper, more suitable jet lag dissolution treatment can be performed. In this case, have a presumed means to presume a user's biorhythm and, as for an operation means, it is desirable that it is what calculates with reference to the biorhythm presumed with this presumed means. What presumes a user's biorhythm can be suitably used for the presumed means in here from physiology measurement results, such as what presumes the measurement result of a user's body active mass which presumes a user's biorhythm from change of light environment to a user's biorhythm, and a user's depths temperature.

[0015]

[Embodiment of the Invention] A positioning means by which one in drawing consisted of a GPS antenna 10 and a GPS receiver 11 in drawing 2 , The memory 20 which records the positioning result which two in drawing is an operation control section which consists of a microcomputer, and was obtained by this operation control section 2 with the positioning means 1, It has last time a positioning result, the time difference detecting element 21 which calculates time difference this time based on the difference of longitude in a positioning result, and the operation part 22 which calculates stimulus timing which gives the luminous stimulus for a jet lag dissolution to the body. And while the above-mentioned positioning means 1 is connected to the operation control section 2 and also the information means 4 for reporting to a user that the above-mentioned result of an operation is the input section 3 for performing positioning directions etc. is connected, the biorhythm information bureau 5 which dedicated the biorhythm-related data of the body which will be referred to on the occasion of the above-mentioned operation is connected.

[0016] The data about a phase response curve [ as opposed to the high illuminance light of the body in the up Norio body rhythm information bureau 5 ], Or the data of the luminous-stimulus timing corresponding to the discrepancy of the biorhythm and the environmental rhythm for which it asked based on the phase response curve, or required optical reinforcement, Or the parameter and biorhythm about biorhythm of the body are advanced, or the function about making it send etc. is dedicated, and the information means 4 is constituted by the display 40 and the buzzer 41 for beep sound generating which consist of a liquid crystal display.

[0017] The positioning means 1 is operated by operating the input section 3 in an origin, and memory 20 is made to incorporate that positioning result in this jet lag dissolution means. And the positioning result in the arrival ground is sent to the operation control section 2 by operating the input section 3 again in the arrival ground. The operation control section 2 makes a calculation decision of the time difference in the time difference detecting element 21 from the difference of the value of the LONG in the positioning result of the obtained arrival ground, and the positioning result of the origin recorded on memory 20. It opts for the treatment according to time difference, for example, those directions which should receive the luminous stimulus of what kind of strength to what kind of timing, based on the data dedicated to the biorhythm information bureau 5 in operation part 22, and this is reported to a user in the information section 4.

[0018] At this time, biorhythm progresses to an environmental rhythm and a case calculates the luminous-stimulus timing and the optical reinforcement which delay biorhythm according to the value of time difference, and are fitted to an environmental rhythm based on the data of the biorhythm information bureau 5. Conversely, when biorhythm is behind to the environmental rhythm, the luminous-stimulus timing and the optical reinforcement which biorhythm is advanced according to the value of time difference, and are fitted to an environmental rhythm are calculated based on the data of the biorhythm information bureau 5, and the result of an operation is reported in the information section 4. Moreover, when there is no time difference, or when time difference is minute, he is trying to report in the example shown in drawing 1 in quest of the luminous-stimulus timing and the optical reinforcement which are strengthened although the present biorhythm phase is not changed. To the display 40 for this information, the thing for which the important matter for winning popularity effectively, the formula of the drug for jet lag symptom relaxation, the important matter on a life, etc. display a luminous stimulus collectively reinforcement [ not only / luminous-stimulus timing or / optical / not only ] (illuminance) is desirable.

[0019] Although the above-mentioned example showed the GPS receiver 11 which can ensure

positioning at every point on the earth as a positioning means 2, it does not restrict to this. For example, you may position by receiving the data utility about a location from the electric wave of a local unit like FM wave, and a receiving antenna and a positional information detector can constitute the positioning means 3 in this case. A universal time meter etc. may be used and LONG may be roughly presumed from the difference between the time of a criterion, and a local time.

[0020] Even when using the GPS receiver 11, jet lag dissolution equipment itself does not need to be equipped with the GPS receiver 11, it may establish a junction means to transmit the GPS receiver's 11 positioning result, and may receive the positioning result sent out from this junction means. If such a junction means is established, it will be convenient, when becoming what can obtain a positioning result the inside of a plane of a jet plane, and in a house and performing the below-mentioned positioning actuation automatically periodically, or when starting advancing biorhythm or delaying it in preparation for the jet lag dissolution after arrival during migration, since it is very long distance migration. A junction means may re-send out the GPS signal itself the inside of a plane and in a house.

[0021] In said explanation of operation, although what performs positioning actuation for directions by the input means 3 in the carrier beam case was shown, it is good for the input means 3 in this case to use what set aside the switch operated in an origin, and the switch operated with an arrival background. When an origin switch is pushed, a positioning result cannot be compared with the past positioning result, but when an arrival ground switch is pushed, time difference shall be calculated, and decision of being a destination in drawing 3 can be judged by whether the arrival ground switch was operated. It is hard turning up to generate the failure of eliminating the past positioning result by actuation of a count in which the same switch was mistaken as compared with the case where multiple-times actuation is carried out, and a count mistake also decreases.

[0022] The positioning means 1 may perform positioning actuation automatically periodically. Whether it arrived at whether the origin was left and or not the destination that what is necessary is just to judge a positioning result by comparing with the last positioning result in this case, about time difference While repeating actuation of writing positioning data in memory 20 this time while computing time difference between the last positioning data for every positioning actuation, as shown in drawing 4, the computed time difference is added to the aggregate value of the time difference from the event of making it start. And if 2 hours is exceeded, when it is made for a time difference aggregate value to operate the operation part 22 which asks for the luminous-stimulus timing and the optical reinforcement which cancel a jet lag, the input from a user is sufficient at the first start time.

[0023] Moreover, if initiation of high-speed migration of a user is detectable, the operation for canceling a jet lag can be started at an early stage. In this case, as shown in drawing 5, the time difference detecting element 21 calculates passing speed periodically from the positioning result of the positioning means 1 and time amount which operate automatically. When this passing speed is over 400km/h If it is made to operate the operation part 22 which asks for the luminous-stimulus timing and the optical reinforcement which cancel a jet lag Even if there is no input from a user, presumption of a user's migration direction or a start location can also be performed using the positioning information on the past which turns to what can tell a user about the danger that a jet lag will arise up, and was memorized.

[0024] Before operating operation part 22 from the decision of time difference and asking for the treatment of a jet lag dissolution, it may be made to perform a migration place check routine as shown in drawing 6. That is, when time difference is computed, it checks whether long-distance migration is given to the user, and the input of whether a current value is a destination is required. For example, is "long-distance migration performed? Is this the destination of a travel? While taking out the display " to a display 40 and taking a check, when it is not a destination, a destination region selection demand and a detail destination selection demand are displayed, and the last destination is obtained as data before the arrival. In addition, the LONG data about a destination region or the detail destination to display are beforehand registered into the operation control section 2 as data. Since the data of the last destination can be obtained before

arriving at the last destination while being able to distinguish whether a point of arrival is the last destination, if it does in this way, not the jet lag management to the time difference in a its present location but the jet lag management to the time difference in the last destination can be started at an early stage.

[0025] It is also desirable to perform jet lag dissolution treatment which performs a stay days check routine as shown in drawing 7 , and is different according to stay days. When a stay at the destination continues for a long period of time, while performing display of choosing the stimulus and guidance which are easy to be adapted for "destination", the jet lag dissolution treatment which doubles biorhythm is calculated and displayed on the environmental rhythm in the destination in operation part 22. When a stay at the destination is a less than short period, for example, two days It is not the stimulus or guidance in which it fits biorhythm to the environmental rhythm in the destination quickly in performing the display "whether it returns to a depature point as it is" and returning to a depature point. When it returns to an origin, and performing the stimulus and guidance which a jet lag stops being able to produce easily and not returning to a depature point, said migration place check routine is called, the input of the next destination is urged, and it is made to carry out the stimulus and guidance for which a jet lag stops being generated easily at the next destination. Jet lag dissolution treatment according to the schedule of a travel can be performed.

[0026] Moreover, if it enables it to use the above-mentioned information while enabling it to memorize the information which shows the long-distance and high-speed migration generated in the near past when long-distance and high-speed migration newly occurs, jet lag dissolution treatment for which it was suitable with a user's situation can be performed. Namely, although the key station of the time difference calculation from there being little possibility that biorhythm is aligning with the environmental rhythm in the point thoroughly is considered as as [ the origin in the past migration ] when a stay at the point at which it arrived by the past migration is less than three days The key station of time difference calculation is changed into the origin (current value) of new migration from it being thought that biorhythm has already aligned with the environmental rhythm in the point when a stay at the point at which it arrived by the past migration is a long period of time. However, since it is that there is individual difference, it is desirable to take a check of a user about modification of a key station in any case. In two above-mentioned modification checks, the nuance shall be changed most, and choosing O.K. shall be strongly called for by the direction of the acknowledgment indicator of key station modification in a long-term stay. Anyway, if a key station is changed, the migration information on past will be eliminated.

[0027] Of course, you may enable it to change a key station at the event of arbitration. A key station check routine is called and it enables it to change a its present location into a key station. Moreover, when the predetermined time detection of the generating of time difference (long-distance migration) cannot be carried out, it may be made to make an automatic change of the its present location in a key station. Although the high illuminance light for jet lag dissolution treatment will be separately obtained with a high illuminance light irradiation device, jet lag dissolution equipment may contain a high illuminance light irradiation device. In this case, a high illuminance light irradiation device shall be operated at the time of day which should receive the luminous stimulus by high illuminance light. Of course, also when a high illuminance light irradiation device is another equipment, the interface 60 which connects jet lag dissolution equipment and the high illuminance light irradiation device 6 is established, and you may enable it to control the actuation time of day of the high illuminance light irradiation device 6 by the jet lag dissolution equipment side to be shown in drawing 2 . That is, through jet lag dissolution equipment, the power source of the high illuminance light irradiation device 6 is supplied, or the high illuminance light irradiation device 6 is operated by sending an on-off signal to the high illuminance light irradiation device 6 which can be operated by remote control from a jet lag dissolution equipment side. This is especially effective when the table top type, the stand mold, or the large-sized high illuminance light irradiation device 6 is reserved in the home or the hotel of a migration place. In addition, if the high illuminance light irradiation device 6 of a visor mold is used, utilization in migration will also become possible.

[0028] Ambient light, such as sunlight, may be used not using a high illuminance light irradiation device. In this case, utilization of light environment can be directed to a user by preparing the light environment measurement section which measures light environment, such as an illuminance of ambient light, and a color temperature, to jet lag dissolution equipment. For example, it directs to a user to direct to a user to bask in light as much as possible using surrounding light environment, if the illuminance of the light environment in the luminous-stimulus time zone for which operation part 22 asked is effective in a jet lag dissolution, to emit warning, if it is the time zone which should avoid light, and to avoid light. Also when using a high illuminance light irradiation device, it is also possible to change the result of an operation in consideration of the ambient light measured in the light environment measurement section. If the buzzer 41 in the information means 4 is operated and a beep sound is emitted on the occasion of the above-mentioned warning, warning can be certainly given to a user. You may make it call a user's attention by the oscillation by vibrator besides information warning by the sound.

[0029] By the way, biorhythm may differ from the phase response curve to a stimulus greatly from the form with standard biorhythm, when it may differ upwards for every individual and the life is irregular. In such a case, since it is inadequate, deciding the timing and reinforcement of a stimulus only from the contents of migration, such as time difference and the direction of migration, inputs into the biorhythm information bureau 5 that individual's biorhythm data measured beforehand, and it is also desirable to refer to this biorhythm data in the operation of jet lag dissolution processing. [ living body ]

[0030] Moreover, the presumed means of a user's biorhythm is formed in jet lag dissolution equipment, and jet lag dissolution equipment may enable it to collect the above-mentioned individual's biorhythm data. "as this presumed means — Are you a mold in the morning? it is a mold night" — "— about what time, if it averages expression parameter of biorhythm which presents the question about the life style of the user whether it can rise automatically", and it has as a basic form from the reply Is there any habit of " and "nap (for example, the amplitude —)? While being able to use what changes a rising phase and the minimum phase, the above-mentioned output of the light environment measurement section can also be used at this time, and also what is equipped with the test-section material of a user's body active mass or depths temperature, and presumes individual biorhythm from this measurement result can be used.

[0031] The example which measured the body active mass continuously for five days by the PIAZO piezoelectric acceleration sensor by which drawing 10 attached to the lumbar part the example which measured the body active mass continuously for five days by the PIAZO piezoelectric acceleration sensor which attached drawing 9 to the wrist is shown. In both cases, at the time of sleep (night), more than a value is almost fixed to 0 at the time of near and recovery (day ranges) (2 – 3 minutes or more), a high value can be intermittently acquired for spacing as a dish. Thus, if sleep and recovery are mostly repeated at fixed spacing, since a body active mass can serve as an index of biorhythm, it can evaluate biorhythm automatically from the measurement result of a body active-mass test section. In this case, recovery time of day and sleeping time of day can be presumed by performing a smoothing filter and threshold processing to the data of a body active mass, and if it enters in the time zone when the recovery time of day or sleeping time of day which repeated this processing more than for two days, and was obtained is fixed, that recovery time of day or sleeping time of day will be used as an index of biorhythm. Of course, it is made to perform this processing at the period when time difference has not occurred automatically.

[0032] Also in depths temperature, since the biorhythm of 24 time periods is clearly shown so that clearly from the measurement result at the time of measuring rectal temperature more than for five days by the rectal temperature sensor shown in drawing 11 , if the minimum point phase and peak phase of depths temperature are presumed for example, by the KOSAINA method, those time of day can be made into the index of biorhythm. Since it is clearer than the case of the amount of physical activities this index's to reflect biorhythm in accuracy, it is dramatically useful in the operation of the stimulus timing for the dissolution of a jet lag. In addition, an eardrum temperature and a core temp can also estimate depths temperature in addition to rectal temperature. Moreover, it can replace with depths temperature and hormone measurement of

Melatonin, cortisol, etc. can also estimate biorhythm automatically to accuracy again.

[0033] Although the above explanation explained the case where the luminous stimulus by high illuminance light was used as treatment of a jet lag dissolution, it may not restrict to this and the time of day which should take in drugs, such as Melatonin hormone and a hypnotic, may be displayed.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the flow chart of the basic actuation in an example of the gestalt of operation of this invention.

[Drawing 2] It is the block diagram of basic form voice same as the above.

[Drawing 3] It is the flow chart of an example of time difference detection actuation same as the above.

[Drawing 4] It is the flow chart of the other examples of time difference detection actuation same as the above.

[Drawing 5] It is the flow chart of passing speed detection actuation same as the above.

[Drawing 6] It is the flow chart of a migration place check routine same as the above.

[Drawing 7] It is the flow chart of a stay days check routine same as the above.

[Drawing 8] It is the flow chart of a key station modification routine same as the above.

[Drawing 9] It is the timing diagram which shows the example of measurement of living body activity same as the above.

[Drawing 10] It is the timing diagram which shows other examples of measurement of living body activity same as the above.

[Drawing 11] It is the timing diagram which shows the example of measurement of a depths temperature same as the above.

[Description of Notations]

1 Positioning Means

2 Operation Control Section

5 Biorhythm Information Bureau

11 GPS Engine

21 Time Difference Detecting Element

22 Operation Part

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[Translation done.]



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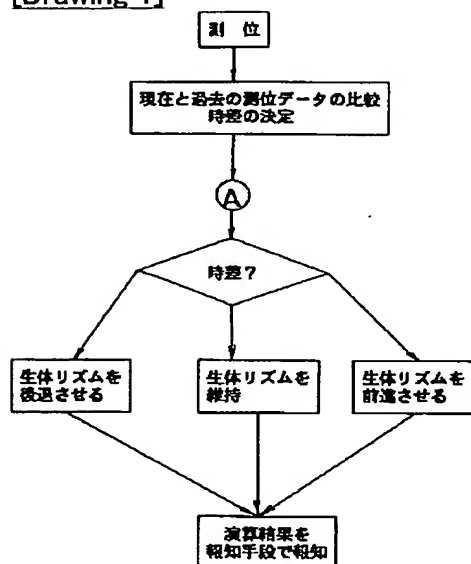
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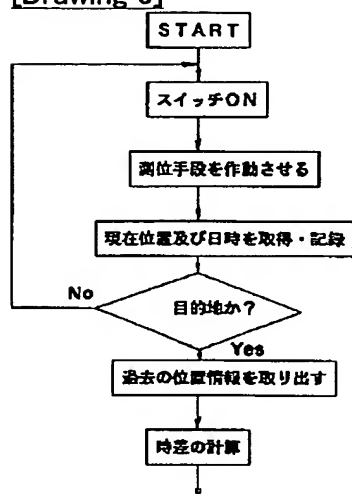
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## DRAWINGS

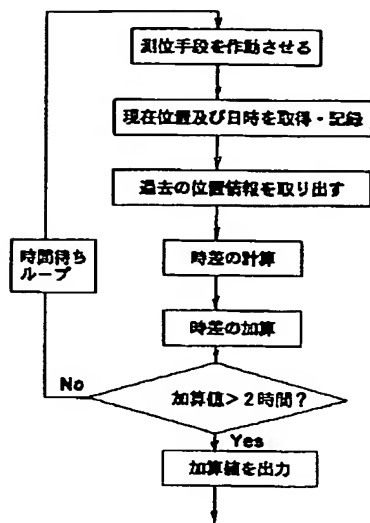
[Drawing 1]



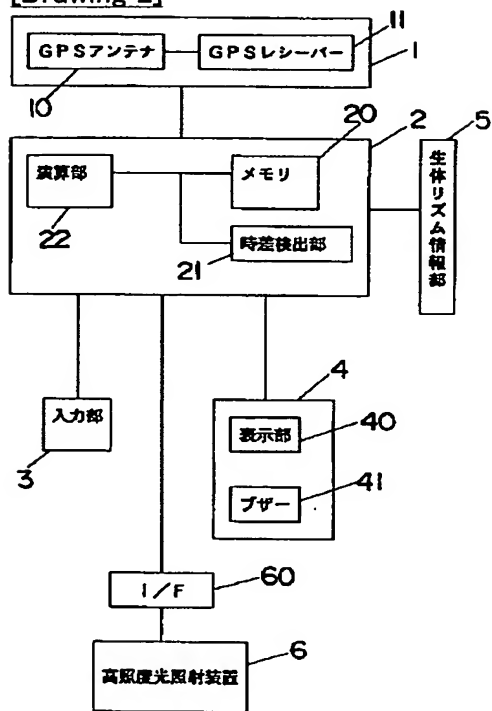
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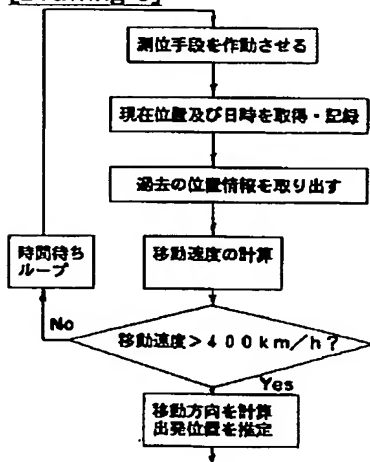
[Drawing 4]



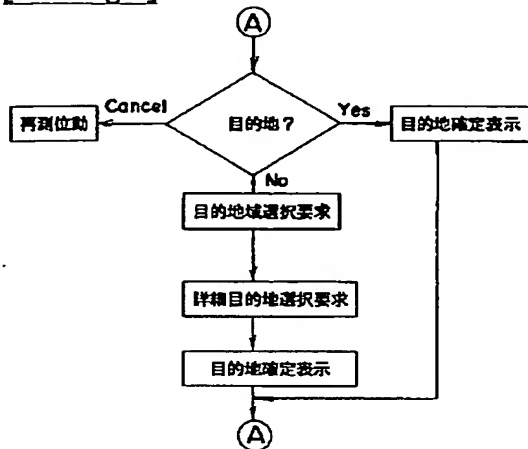
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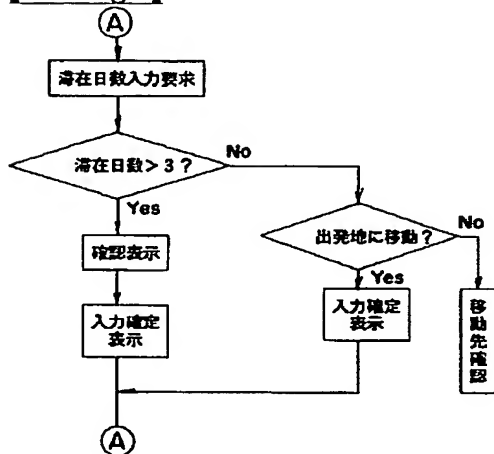
[Drawing 5]



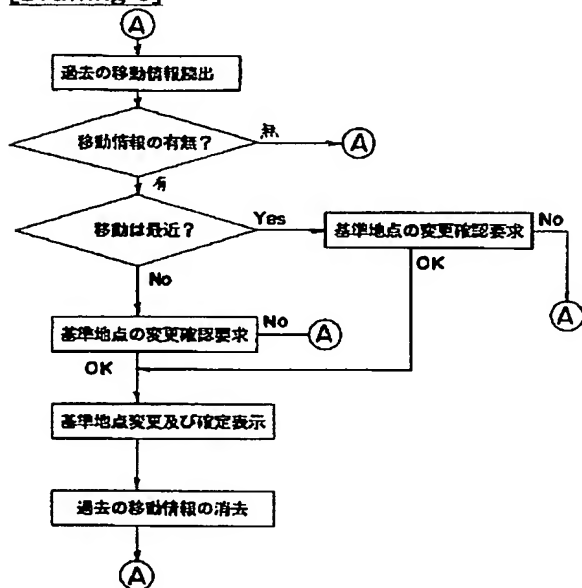
[Drawing 6]



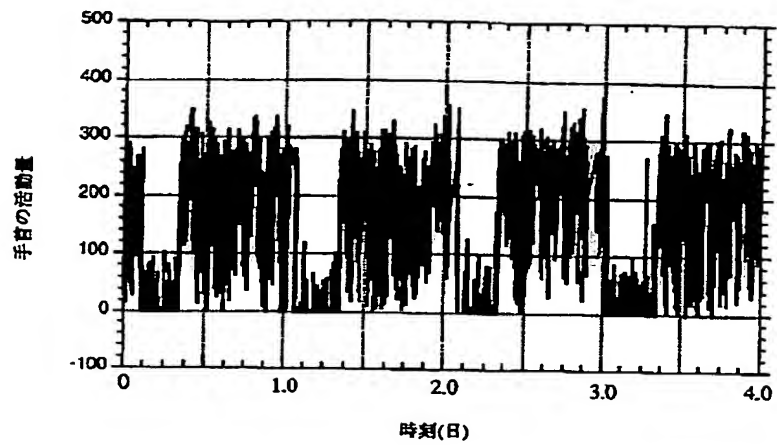
[Drawing 7]



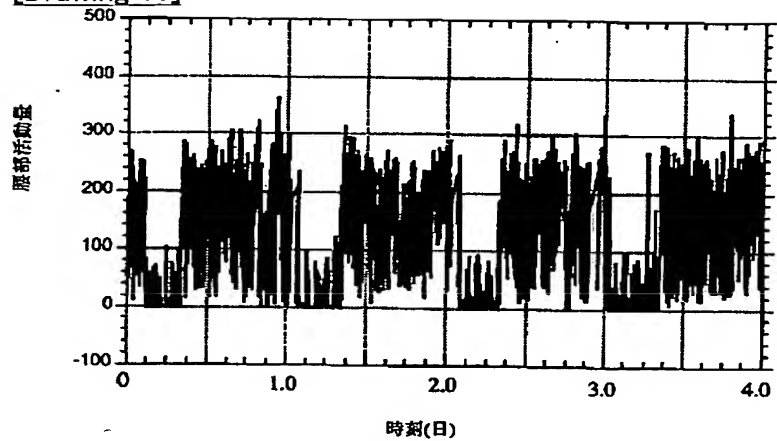
[Drawing 8]



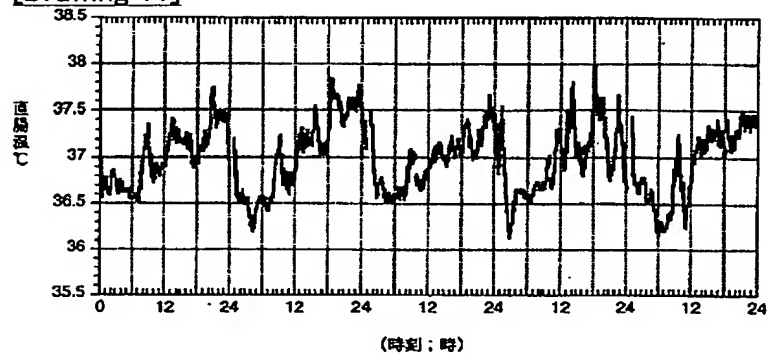
[Drawing 9]



[Drawing 10]



[Drawing 11]



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[Translation done.]

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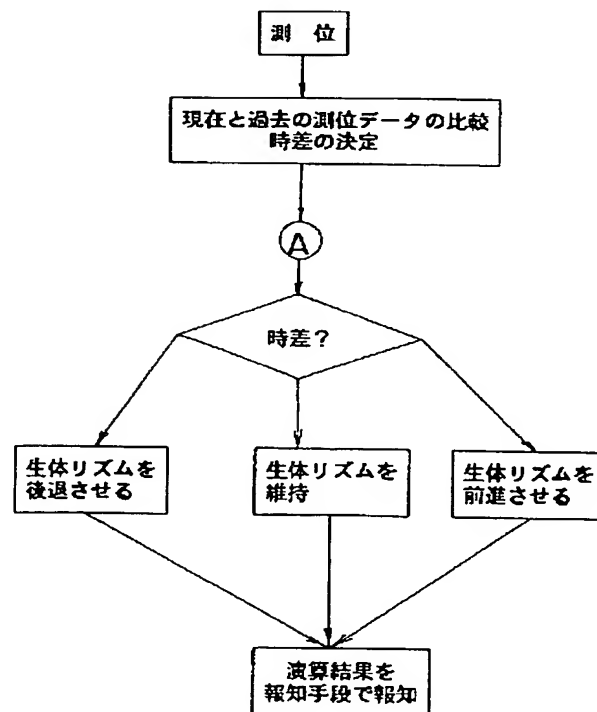
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(54) 【発明の名称】 時差ぼけ解消装置

(57) 【要約】

【課題】 使用者による時差の入力が不要であって使い勝手がよい上に常に適切な処置を行うことができる。

【解決手段】 現在地の測位を行う測位手段1と、前回測位結果と今回測位結果とから時差を算出する時差検出手段2と、時差情報に基づいて時差ぼけ解消のための生体への刺激タイミングを演算する演算手段3と、演算結果を報知する報知手段4とからなる。測位手段による測位結果によって移動の前後の地点での時差を時差ぼけ解消装置側で算出するために、使用者が「出発地」と到着地との間の時差を知っている必要がない上に入力する必要もなく、正確な時差に基づく時差ぼけ解消のための処置を行うことができる。



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## 【特許請求の範囲】

【請求項1】 現在地の測位を行う測位手段と、前回測位結果と今回測位結果とから時差を算出する時差検出手段と、時差情報に基づいて時差ぼけ解消のための生体への刺激タイミングを演算する演算手段と、演算結果を報知する報知手段とからなる時差ぼけ解消装置。

【請求項2】 測位手段はGPS信号を受信して測位を行うGPSレシーバーであることを特徴とする請求項1記載の時差ぼけ解消装置。

【請求項3】 測位手段はGPS信号を中継する中継手段と、中継された信号を受信して測位を行うものであることを特徴とする請求項1または2記載の時差ぼけ解消装置。

【請求項4】 測位手段はその測位動作を入力手段による指示に応じて行うものであることを特徴とする請求項1～3のいずれかの項に記載の時差ぼけ解消装置。

【請求項5】 測位手段はその測位動作を所定時間毎に自動で行うものであることを特徴とする請求項1～3のいずれかの項に記載の時差ぼけ解消装置。

【請求項6】 時差検出手段は測位動作毎に得られる時差の積算値を出力するものであることを特徴とする請求項4または5記載の時差ぼけ解消装置。

【請求項7】 演算手段は、測位結果から得られる移動速度が所定速度以上である時に時差ぼけ解消のための演算を行うものであることを特徴とする請求項1記載の時差ぼけ解消装置。

【請求項8】 演算手段は、入力部から入力される目的地到着後のスケジュールを考慮して演算を行うものであることを特徴とする請求項1記載の時差ぼけ解消装置。

【請求項9】 光環境計測部を備えており、演算手段は光環境計測部の計測結果を考慮して演算を行うものであることを特徴とする請求項1記載の時差ぼけ解消装置。

【請求項10】 演算部の出力結果に応じて動作が制御されるとともに生体への刺激のための高照度光を出力する高照度光出力手段を備えていることを特徴とする請求項1記載の時差ぼけ解消装置。

【請求項11】 生体への刺激のための高照度光を出力する高照度光出力手段の動作を制御するインターフェース部を備えていることを特徴とする請求項1記載の時差ぼけ解消装置。

【請求項12】 生体リズムの基準地点の設定のための基準地点設定手段を備えていることを特徴とする請求項1記載の時差ぼけ解消装置。

【請求項13】 時差の発生の有無と経過時間とから生体リズムの基準地点を変更する基準地点設定手段を備えていることを特徴とする請求項1記載の時差ぼけ解消装置。

【請求項14】 演算手段は使用者固有の生体リズムを表現する生体リズムデータを保有していることを特徴とする請求項1記載の時差ぼけ解消装置。

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【請求項15】 使用者の生体リズムを推定する推定手段を備えており、演算手段はこの推定手段で推定された生体リズムを参照して演算を行うものであることを特徴とする請求項14記載の時差ぼけ解消装置。

【請求項16】 推定手段は光環境の変化から使用者の生体リズムを推定するものであることを特徴とする請求項15記載の時差ぼけ解消装置。

【請求項17】 推定手段は使用者の身体活動量の計測結果から使用者の生体リズムを推定するものであることを特徴とする請求項15記載の時差ぼけ解消装置。

【請求項18】 推定手段は使用者の深部体温などの生理計測結果から使用者の生体リズムを推定するものであることを特徴とする請求項15記載の時差ぼけ解消装置。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は時差ぼけ（ジェット・ラグ）を解消するための装置に関する。

【0002】

【従来の技術】数時間以上の時差がある地域へジェット機などで高速に移動した際、一過性または持続性の心身不調状態、たとえば睡眠障害、日中の眠気、集中力の低下、疲労感、食欲の低下といった症状に陥るが、時差ぼけと称されているこの症状は、仕事における生産性を低下させたり重要な判断ミスを生じさせたりするばかりか、日常生活の質も低下させてしまうものであり、海外旅行者や出張者などでジェット機の利用者が増えている今日では大きな社会問題となっている。

【0003】ところで時差ぼけとは、主としてほぼ24時間周期の体内の生体リズムと環境のリズムとの間に生じた大きなずれを要因とするものであり、また時差のある地域への移動後の現地環境に適応する過程で体内の複数の生理機能の間で一時的に協調性が乱れることや、旅行中の睡眠不足及び不規則な生活からくる疲労が時差ぼけの症状をさらに悪化させるものとなっている。

【0004】このような時差ぼけは、環境リズムに対してずれが生じてしまった生体リズムを環境リズムに再同調させることで解消することができるとともに、この同調させるという点に関して高照度光が有効であることが既に科学的に証明されている。すなわち、高照度光の人に対する位相反応曲線に基づき、上記ずれの値から導かれる適切な時刻に高照度光による光刺激を与えることにより、環境リズムに生体リズムを早期に同調させることができ、この結果、時差ぼけを解消することができる。

【0005】ここにおいて、上記環境リズムと生体リズムとのずれの値を出発地と到着地との時差の値で代用し、高照度光による光刺激を与えるべき時刻を計算して使用者に知らせるものが提供されている。また特表平3-502727号公報には、時差に応じて日光を浴びるべき時間帯を表示するものが示されている。

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## 【0006】

【発明が解決しようとする課題】上記従来例においては、環境リズムと生体リズムとのずれの値に時差の値が一致している場合、指示された時刻に光刺激を受けることによって時差ぼけに対処することができるが、使用者が時差の値を入力しなければならないという点で問題を有している。すなわち、出発地と到着地とにおいて時差がいくらかであるかを使用者が認識していなくてはならない上に、その値を正確に入力しなくてはならないが、使用者が時差の値を知っているとは限らない上に、時差の値を知っていても出発地に対して到着時の時刻が進んでいるのか遅れているのかを入力し間違えることもあり、多忙でストレスに囲まれた旅行中の使用者に上記入力を強いるものは、誤入力に基づく誤動作を招いてしまう可能性が高いし、使用者にしてみれば使い勝手が良いとは言えない。

【0007】本発明はこのような点に鑑み為されたものであり、その目的とするところは使用者による時差の入力が不要であって使い勝手がよい上に常に適切な処置を行うことができる時差ぼけ解消装置を提供するにある。

## 【0008】

【課題を解決するための手段】しかしして本発明に係る時差ぼけ解消装置は、現在地の測位を行う測位手段と、前回測位結果と今回測位結果とから時差を算出する時差検出手段と、時差情報に基づいて時差ぼけ解消のための生体への刺激タイミングを演算する演算手段と、演算結果を報知する報知手段とからなることに特徴を有している。

【0009】本発明によれば測位手段による測位結果によって移動の前後の地点での時差を時差ぼけ解消装置側で算出するために、使用者が出発地と到着地との間の時差を知っている必要がない上に入力する必要もなく、正確な時差に基づく時差ぼけ解消のための処置を行うことができる。ここにおける測位手段はGPS信号を受信して測位を行うGPSレシーバーを好適に用いることができる。地球上のどの地点においても測位を行うことができる。この時、GPS信号を直接受けて測位を行うのではなく、GPS信号を中継する中継手段によって中継された信号を受信して測位を行うものであってもよい。ジェット機の機内や家屋内においても測位を行うことができるものとなる。

【0010】測位手段による測位動作は、入力手段による指示に応じて行うものであっても、所定時間毎に自動で行うものであってもよく、いずれの場合も時差検出手段は測位動作毎に得られる時差の積算値を出力するものとしておくと、いくつかの地点を中継して最終目的地に向かう場合などに都合がよい。また演算手段は、測位結果から得られる移動速度が所定速度以上である時に演算を行うものであると、無用な演算処理を行うことがなくなる。

【0011】演算手段は、入力部から入力される目的地到着後のスケジュールを考慮して演算を行うものであると、最終目的地に向けての時差ぼけ解消処置をスムーズに行うことができる。光環境計測部を備えて、演算手段は光環境計測部の計測結果を考慮して演算を行うものであると、刺激として光を用いる場合、環境光を利用することができる。

【0012】生体への刺激のための高照度光を出力する高照度光出力手段を備えて演算手段の出力で高照度光出力手段の動作を制御するならば、別途高照度光出力手段を用意する必要がないものとなる。生体への刺激のための高照度光を出力する高照度光出力手段の動作を制御するインターフェース部を備えたものとしておく時には、高照度光出力手段として目的地にあるものを利用することができる。

【0013】生体リズムの基準地点の設定のための基準地点設定手段を備えていることも好ましい。目的地での長期滞在で生体リズムが現地での環境リズムに適合している場合、次の長距離移動に備えることができる。時差の発生の有無と経過時間とから生体リズムの基準地点を変更する基準地点設定手段を備えたものとしておくならば、基準地点の変更を自動で行うことができる。

【0014】演算手段が使用者固有の生体リズムを表現する生体リズムデータを保有していると、より適切な時差ぼけ解消処置を行うことができる。この場合、使用者の生体リズムを推定する推定手段を備えて、演算手段はこの推定手段で推定された生体リズムを参照して演算を行うものであることが好ましく、ここにおける推定手段には、光環境の変化から使用者の生体リズムを推定する、使用者の身体活動量の計測結果から使用者の生体リズムを推定するもの、使用者の深部体温などの生理計測結果から使用者の生体リズムを推定するものなどを好適に用いることができる。

## 【0015】

【発明の実施の形態】図2において、図中1はGPSアンテナ10及びGPSレシーバー11で構成された測位手段、図中2はマイクロコンピュータからなる演算制御部であり、該演算制御部2には測位手段1で得られた測位結果を記録するメモリ20と、前回測位結果と今回測位結果とにおける経度差に基づいて時差を演算する時差検出部21と、時差ぼけ解消のための光刺激を人体に与える刺激タイミングの演算を行う演算部22とを備えている。そして演算制御部2には上記測位手段1が接続されているほか、測位指示などを行うための入力部3と、上記演算結果を使用者に報知するための報知手段4とが接続されているとともに、上記演算に際して参照することになる人体の生体リズム関連のデータを納めた生体リズム情報部5が接続されている。

【0016】上記生体リズム情報部5は、人体の高照度光に対する位相反応曲線に関するデータ、あるいは位相

反応曲線に基づいて求めた生体リズムと環境リズムとのずれの量に対応する光刺激タイミングや必要な光強度のデータ、あるいは人体の生体リズムに関するパラメータと生体リズムを進めたり送らせたりすることに関する関数等を納めたものであり、報知手段4は液晶ディスプレイからなる表示部40と警告音発生用のブザー41とによって構成されている。

【0017】この時差ばけ解消手段においては、出発地において入力部3を操作することで測位手段1を作動させてその測位結果をメモリ20に取り込ませる。そして到着地において再度入力部3を操作することで到着地での測位結果を演算制御部2に送る。演算制御部2は得られた到着地の測位結果とメモリ20に記録された出発地の測位結果とにおける経度の値の差から時差検出部21において時差を算出決定し、演算部22において生体リズム情報部5に納められたデータを基に時差に応じた処置、たとえばどのような強さの光刺激をどのようなタイミングで受けるべきかの指示を決定し、報知部4においてこれを使用者に報知する。

【0018】この時、環境リズムに対して生体リズムが進んで場合は時差の値に応じて生体リズムを遅らせて環境リズムに適合させる光刺激タイミング及び光強度を生体リズム情報部5のデータを基に演算し、逆に環境リズムに対して生体リズムが遅れている場合は時差の値に応じて生体リズムを進ませて環境リズムに適合させる光刺激タイミング及び光強度を生体リズム情報部5のデータを基に演算し、演算結果を報知部4において報知するのである。また、図1に示す例においては、時差が無い場合、もしくは時差が微小である場合、現在の生体リズム位相を変化させないものの強化する光刺激タイミング及び光強度を求めて報知するようにしている。この報知のための表示部40には、光刺激タイミングや光強度（照度）についてだけでなく、光刺激を有効に受けるための留意点、時差ばけ症状緩和用の薬物の処方や生活上の留意点なども併せて表示することも好ましい。

【0019】測位手段2として上記の例では地球上のどの地点においても測位を確実に行うことができるGPSレーサー11を示したが、これに限るものではない。たとえばFM波のような地域単位の電波から位置に関する情報サービスを受けることによって測位を行ってもよく、この場合の測位手段3は受信アンテナと位置情報検出回路により構成することができる。世界時計などを利用し、標準時とローカルタイムの違いから経度を大雑把に推定するものであってもよい。

【0020】GPSレーサー11を用いる場合でも時差ばけ解消装置そのものがGPSレーサー11を備えていなくてもよく、GPSレーサー11の測位結果を送信する中継手段を設けて、該中継手段から送り出された測位結果を受信するものであってもよい。このような中継手段を設けたならば、ジェット機の機内や家屋内に

においても測位結果を得ることができるものとなり、後述の測位動作を定期的に自動で行う場合や、きわめて長距離な移動であるために、移動中においても到着後の時差ばけ解消に備えて生体リズムを進ませたり遅らせたりすることを開始する場合に都合がよい。中継手段はGPS信号そのものを機内や家屋内に再送出するものであってもよい。

【0021】前記動作説明においては、入力手段3による指示を受けた際に測位動作を行うものを示したが、この場合の入力手段3には、出発地で操作するスイッチと到着地で操作するスイッチとを別にしたものを用いるとよい。出発地スイッチが押された場合には測位結果を過去の測位結果と比較せず、到着地スイッチが押された場合に時差の計算を行うものとしておくわけであり、図3における目的地か否かの判断は到着地スイッチが操作されたか否かで判定することができる。同じスイッチを複数回操作する場合に比して、誤った回数の操作で過去の測位結果を消去してしまうといった操作ミスが生じにくくなる上に、計算ミスも少なくなる。

【0022】測位手段1が定期的に自動で測位動作を行うものであってもよい。この場合、出発地を出発したか否か、あるいは目的地に到着したか否かは測位結果を前回の測位結果と比較することで判定すればよく、また時差については、図4に示すように測位動作毎に前回の測位データとの間で時差を算出するとともに今回測位データをメモリ20に書き込むという動作を繰り返すとともに、算出した時差はスタートさせた時点からの時差の加算値に加算していくのである。そして時差加算値がたとえば2時間を越えたならば、時差ばけを解消する光刺激タイミング及び光強度を求める演算部22を作動させるようにしておくと、使用者からの入力は最初のスタート時だけでよいものとなる。

【0023】また、使用者の高速な移動の開始を検出することができるのであれば、時差ばけを解消するための演算を早期に開始することができるものとなる。この場合、図5に示すように時差検出部21は定期的に自動で作動する測位手段1の測位結果と時間とから移動速度を計算し、この移動速度がたとえば時速400kmを越えている時には、時差ばけを解消する光刺激タイミング及び光強度を求める演算部22を作動させるようにしておくと、使用者からの入力がなくとも時差ばけが生じる危険性を使用者に知らせることができるものとなる上に、記憶した過去の測位情報を用いて使用者の移動方向や出発位置の推定を行っておくこともできるものとなる。

【0024】時差の決定から演算部22を作動させて時差ばけ解消の処置を求める前に、図6に示すような移動先確認ルーチンを実行するようにしてもよい。つまり、時差が算出された時点で使用者に長距離移動を行っているかどうかを確認し、現在値が目的地であるかどうかの入力を要求するのである。たとえば「長距離移動を行っ



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ていますね。ここは旅行の目的地ですか？」という表示を表示部40に出して確認をとるとともに、目的地ではない場合は目的地地域選択要求や詳細目的地選択要求を表示し、最終目的地をその到着前にデータとして得るのである。なお、表示する目的地地域や詳細目的地についての経度データは予め演算制御部2にデータとして登録しておく。このようにすれば、到着地点が最終目的地であるかどうかを判別することができるとともに、最終目的地に達する前に最終目的地のデータを得ることができるために、現在地での時差に対する時差ぼけ対処ではなく、最終目的地での時差に対する時差ぼけ対処を早期に開始することができる。

【0025】図7に示すような滞在日数確認ルーチンを実行し、滞在日数に応じて異なる時差ぼけ解消処置を行うことも好ましい。目的地での滞在が長期にわたる場合には、たとえば「目的地に適応しやすい刺激やガイダンスを選択します」といった表示を行うとともに、目的地での環境リズムに生体リズムを合わせる時差ぼけ解消処置を演算部22において演算して表示する。目的地での滞在が短期、たとえば2日以内である場合には、「そのまま出発地点へ戻るのですか？」といった表示を行い、出発地点に戻る場合には生体リズムを目的地での環境リズムに急速に適応させる刺激やガイダンスではなく、出発地に戻った時に時差ぼけが生じにくくなる刺激やガイダンスを行い、出発地点へ戻るのではない場合は、前記移動先確認ルーチン呼び出して次の目的地の入力を促し、次の目的地において時差ぼけが生じにくくなる刺激やガイダンスを行うようにするのである。旅行のスケジュールに応じた時差ぼけ解消処置を行うことができる。

【0026】また、近い過去に発生した長距離且つ高速な移動を示す情報を記憶することができるようにしておくとともに、新たに長距離且つ高速な移動が発生した場合に上記情報を利用できるようにしておくならば、使用者の状況により適した時差ぼけ解消処置を実行することができるものとなる。すなわち、過去の移動で到着した地点での滞在がたとえば3日以内であった場合、生体リズムはその地点での環境リズムに完全に同調している可能性は少ないことから、時差算出の基準地点は過去の移動での出発地のままとしておくが、過去の移動で到着した地点での滞在が長期である時には生体リズムがその地点での環境リズムに既に同調していると思われることから、時差算出の基準地点を新たな移動の出発地（現在値）に変更するのである。ただし、個人差があることであるために、いずれの場合にも基準地点の変更について使用者の確認をとるようにしておくことが望ましい。もっとも上記2つの変更確認においてはそのニュアンスを変えておき、長期滞在の場合の基準地点変更の確認表示の方はOKを選ぶことが強く求められるものとしておく。いずれにしても基準地点を変更したならば過去の移動情報は消去する。

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【0027】もちろん、基準地点を任意の時点で変更することができるようにしておいてもよい。基準地点確認ルーチン呼び出して、現在地を基準地点に変更することができるようにしておくのである。また、時差（長距離移動）の発生が所定時間検出できない時には現在地を基準地点に自動変更するようにしてもよい。時差ぼけ解消処置のための高照度光は、別途高照度光照射装置によって得ることになるが、時差ぼけ解消装置が高照度光照射装置を内蔵するものであってもよい。この場合、高照度光による光刺激を受けるべき時刻に高照度光照射装置を作動させるものとすることができる。もちろん、高照度光照射装置が別の装置である場合にも、図2に示すように、時差ぼけ解消装置と高照度光照射装置6とを接続するインターフェース60を設けて、高照度光照射装置6の作動時刻を時差ぼけ解消装置側で制御することができるようにしてもよい。つまり、時差ぼけ解消装置を通じて高照度光照射装置6の電源を供給したり、リモートコントロール可能な高照度光照射装置6に時差ぼけ解消装置側からオンオフ信号を送ることで高照度光照射装置6を作動させるのである。これは家庭や移動先のホテルに卓上型やスタンド型、あるいは大型の高照度光照射装置6が常備されている場合においては特に有効である。なお、バイザー型の高照度光照射装置6を用いると、移動中での利用も可能となる。

【0028】高照度光照射装置を用いるのではなく、太陽光などの環境光を用いてもよい。この場合、時差ぼけ解消装置に環境光の照度や色温度などの光環境を計測する光環境計測部を設けておくことで、光環境の利用を使用者に指示することができる。たとえば演算部22が求めた光刺激時間帯での光環境の照度が時差ぼけ解消に有効であるならば、周囲の光環境を利用して光をできるだけ浴びるように使用者に指示し、光を避けるべき時間帯であるならば警告を発して光を避けるように使用者に指示するのである。高照度光照射装置を用いる場合にも、光環境計測部で計測した環境光を考慮して演算結果を変更することも可能である。上記警告に際しては、報知手段4におけるブザー41を作動させて警告音を発するようにしておくことと使用者に確実に警告を与えることができる。音による報知警告のほか、バイブレーションによる振動で使用者の注意を喚起するようにしてもよい。

【0029】ところで、生体リズム及び刺激に対する位相反応曲線は個人ごとに異なる可能性がある上に、生活が不規則になっている場合、生体リズムが標準的な形から大きく異なっている可能性がある。このような場合は生体への刺激のタイミング及び強度を時差や移動の方向といった移動内容だけで決めることは不十分であることから、生体リズム情報部5に予め測定したその個人の生体リズムデータを入力しておき、時差ぼけ解消処理の演算にあたって、この生体リズムデータを参照するのも好ましい。

【0030】また、時差ぼけ解消装置に使用者の生体リズムの推定手段を設けて、上記個人の生体リズムデータを時差ぼけ解消装置が収集することができるようにしていてもよい。この推定手段としては、「あなたは朝型ですか？夜型ですか？」、「平均すると何時頃、自然に起床できますか？」、「昼寝の習慣はありますか？」といった使用者のライフスタイルについての質問を提示してその回答から基本形として持っている生体リズムの表現パラメータ（たとえば振幅、起床位相、最低位相）を変更するものを用いることができるとともに、この時、上記した光環境計測部の出力も利用することができるほか、使用者の身体活動量や深部体温の測定部材を備えてこの測定結果から個人の生体リズムを推定するものを用いることができる。

【0031】図9は手首に付けたピエゾ圧電型加速度センサーによって身体活動量を5日間連続的に計測した例を、図10は腰部に付けたピエゾ圧電型加速度センサーによって身体活動量を5日間連続的に計測した例を示している。どちらの場合も睡眠時（夜間）はほとんど値が0に近く、覚醒時（昼間）は一定以上（2～3分以上）の間隔をおかずに断続的に高い値を得られる。このように睡眠と覚醒がほぼ一定間隔で繰り返されると身体活動量は生体リズムの指標となり得ることから、身体活動量測定部の測定結果から自動的に生体リズムを評価することができる。この場合、身体活動量のデータに対して平滑化フィルターや閾値処理を行うことで覚醒時刻や就寝時刻を推定することができ、この処理を2日間以上繰り返して得られた覚醒時刻または就寝時刻が一定の時間帯に入れば、その覚醒時刻または就寝時刻を生体リズムの指標として利用する。この処理は時差が発生していない期間に自動的に行うようにしておくのはもちろんである。

【0032】深部体温の場合も、図11に示す直腸温センサーによって直腸温を5日間以上計測した場合の計測結果から明らかなように、24時間周期の生体リズムを明確に示すことから、たとえばコサイナー法によって深部体温の最低点位相や最高点位相を推定すれば、それらの時刻を生体リズムの指標とすることができる。この指標は身体活動量の場合よりも正確に生体リズムを反映することが明らかとなっているために、時差ぼけの解消のための刺激タイミングの演算において非常に有用である。なお、深部体温は直腸温以外に鼓膜温やコアTEMPでも評価することができる。また深部体温に代えて、メラトニンやコルチゾルなどのホルモン計測によっても生体リズムを正確にまた自動的に評価することができる。

【0033】以上の説明では時差ぼけ解消の処置として高照度光による光刺激を用いる場合について説明したが、これに限るものではなく、メラトニンホルモンや睡眠薬などの薬物を摂取すべき時刻を表示するものであってもよい。

【0034】

【発明の効果】以上のように本発明における時差ぼけ解消装置は、現在地の測位を行う測位手段と、前回測位結果と今回測位結果とから時差を算出する時差検出手段と、時差情報に基づいて時差ぼけ解消のための生体への刺激タイミングを演算する演算手段と、演算結果を報知する報知手段とからなり、測位手段による測位結果によって移動の前後の地点での時差を時差ぼけ解消装置側で算出するために、使用者が発見地と到着地との間の時差を知っている必要がない上に入力する必要もなく、従って使用者を煩わせることのない使い勝手が良いものとなることができると同時に、正確な時差情報に基づく時差ぼけ解消のための処置を行うことができるものである。

【0035】そして上記測位手段として、GPS信号を受信して測位を行うGPSレシーバーを用いたならば、地球上のどの地点においても測位を行うことができるために、到着地を選んでしまうことがなく、常に最適な時差ぼけ解消処置を行うことができる。この時、GPS信号を直接受けて測位を行うのではなく、GPS信号を中継する中継手段によって中継された信号を受信して測位を行うならば、移動中のジェット機の機内や家屋内においても測位を行うことができるために、GPS信号を直接受信できないために生ずる不都合がなくなる上に、目的地に到着するまでの移動中の時点から時差ぼけ解消処置を開始することもできる。

【0036】測位手段による測位動作は、入力手段による指示に応じて行うものであれば、目的地への到着時点を確認に指示することができる。また測位手段による測位動作は、所定時間毎に自動で行うものであってもよい。この場合は入力手段による指示の必要がなくなるために、使い勝手がさらに良好となる。いずれの場合も時差検出手段は測位動作毎に得られる時差の積算値を出力するものとしておくと、移動中においても時差ぼけ解消処置を開始することができると同時に最終目的地での時差も得ることができる。

【0037】また演算手段は、測位結果から得られる移動速度が所定速度以上である時に演算を行うものであると、無用な演算処理を行うことがなくなる。さらに演算手段は、入力部から入力される目的地到着後のスケジュールを考慮して演算を行うものであると、途中経由地の環境リズムの影響をあまり受けることなく、最終目的地に向けての時差ぼけ解消処置をスムーズに行うことができる。

【0038】光環境計測部を備えて、演算手段は光環境計測部の計測結果を考慮して演算を行うものであってもよい。時差ぼけ解消のための刺激として光を用いる場合、環境光を積極的に利用することができるものとなる。生体への刺激のための高照度光を出力する高照度光出力手段を備えたものであれば、別途高照度光出力手段を用意する必要がなくなると同時に、時差ぼけ解消処置

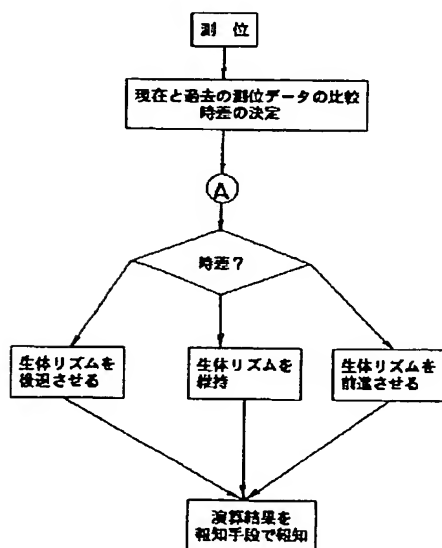
を適切な時刻に的確に行うことができるものとなる。

【0039】生体への刺激のための高照度光を出力する高照度光出力手段の動作を制御するインターフェース部を備えたものとしておいてもよく、この場合、高照度光出力手段として目的地にあるものを利用することができるために、高照度光出力装置を同時に持ち歩く必要がなくなり、旅行に適したものとなる。生体リズムの基準地点の設定のための基準地点設定手段を備えていることも好ましい。目的地での長期滞在で生体リズムが現地での環境リズムに適合している場合、次の長距離移動に備えることができることになり、時差ぼけ解消処置を常に適切に行うことができるものとなる。時差の発生の有無と経過時間とから生体リズムの基準地点を変更する基準地点設定手段を備えたものとしておくならば、上記基準地点の変更を自動で行うことができ使い勝手が良好となる。

【0040】演算手段が使用者個人の生体リズムを表現する生体リズムデータを保有していると、より適切な時差ぼけ解消処置を行うことができる。この場合、使用者の生体リズムを推定する推定手段を備えて、演算手段はこの推定手段で推定された生体リズムを参照して演算を行うものとして構成しておくことが好ましい。推定手段として、光環境の変化から使用者の生体リズムを推定する、使用者の身体活動量の計測結果から使用者の生体リズムを推定するもの、使用者の深部体温などの生理計測結果から使用者の生体リズムを推定するものなどを好適に用いることができる。

【図面の簡単な説明】

【図1】



【図1】本発明の実施の形態の一例における基本動作のフローチャートである。

【図2】同上の基本形態のブロック図である。

【図3】同上の時差検出動作の一例のフローチャートである。

【図4】同上の時差検出動作の他例のフローチャートである。

【図5】同上の移動速度検出動作のフローチャートである。

10 【図6】同上の移動先確認ルーチンのフローチャートである。

【図7】同上の滞在日数確認ルーチンのフローチャートである。

【図8】同上の基準地点変更ルーチンのフローチャートである。

【図9】同上の生体活性度の測定例を示すタイムチャートである。

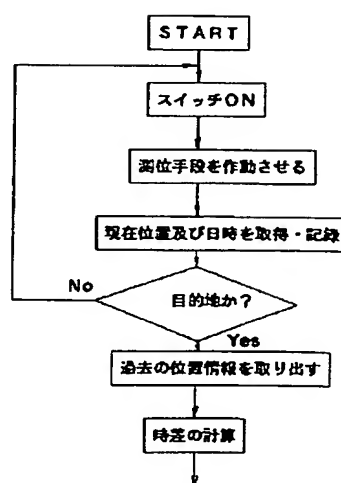
【図10】同上の生体活性度の他の測定例を示すタイムチャートである。

20 【図11】同上の深部体温の測定例を示すタイムチャートである。

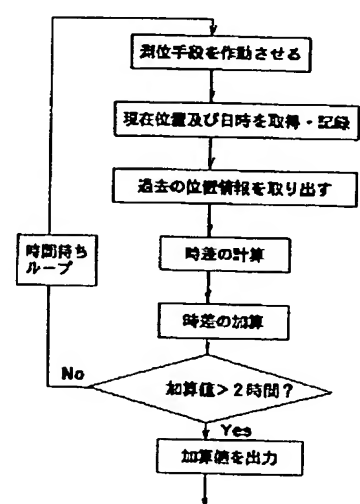
【符号の説明】

- 1 測位手段
- 2 演算制御部
- 5 生体リズム情報部
- 11 GPSエンジン
- 21 時差検出部
- 22 演算部

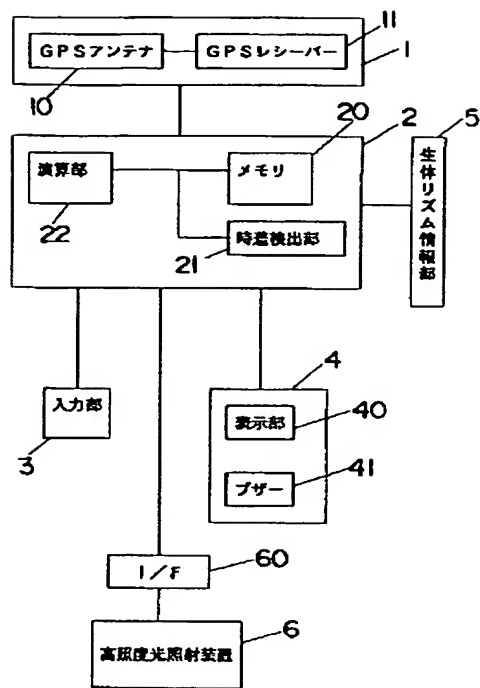
【図3】



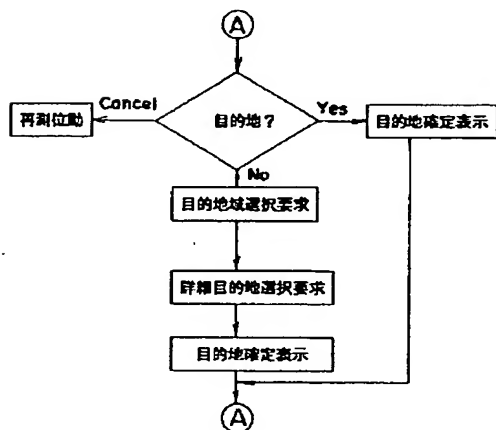
【図4】



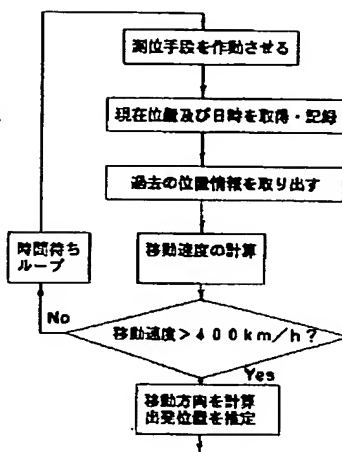
【図2】



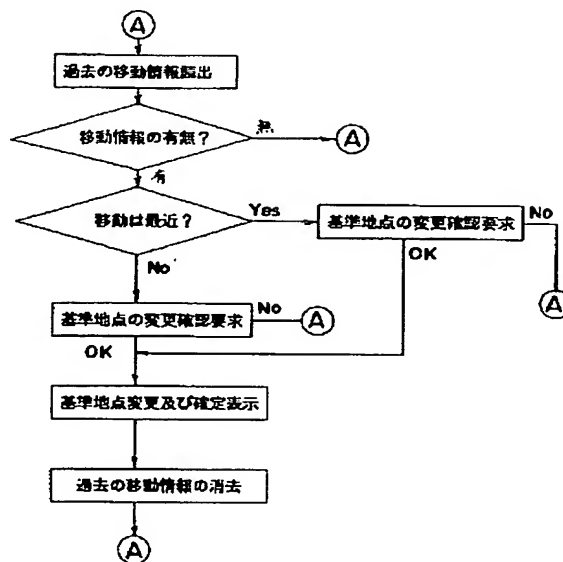
【図6】



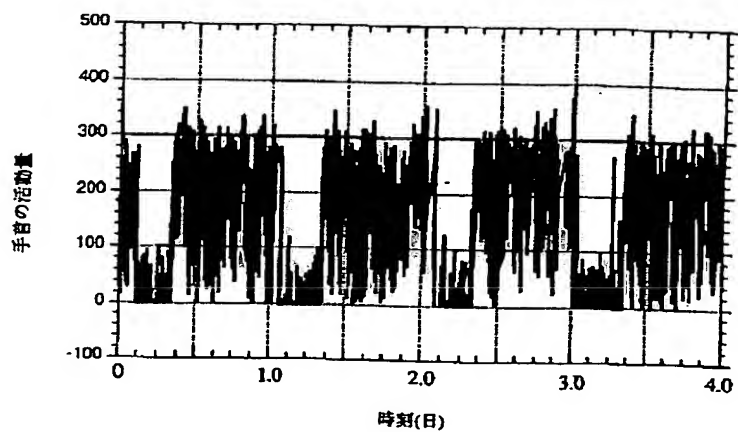
【図5】



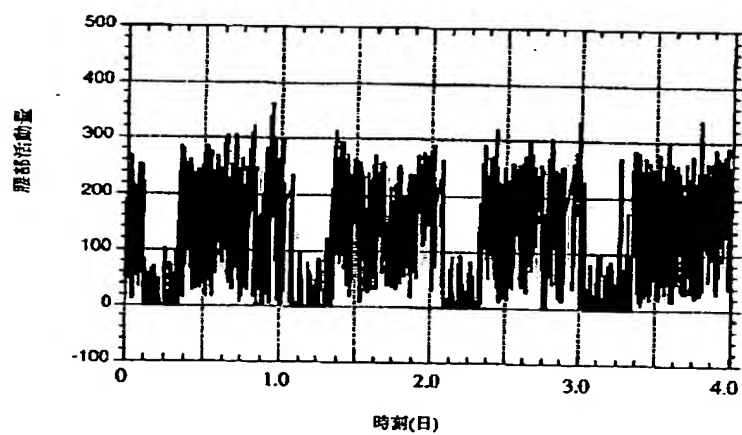
【図8】



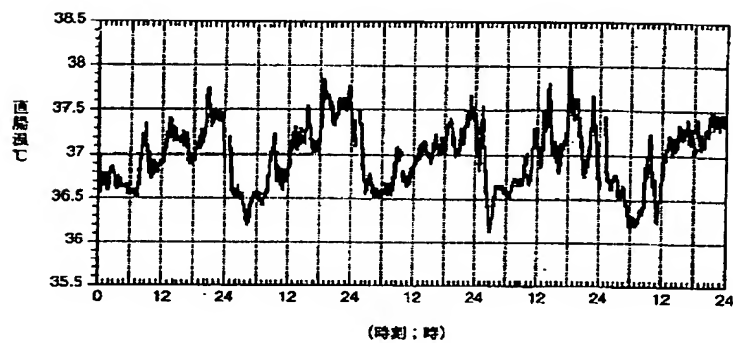
【図9】



【図10】



【図11】




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